

## **AMMENDMENTS TO THE SPECIFICATION**

Applicants respectfully request the Examiner to replace the numbered paragraphs as listed below in the application.

**[0002]** The present invention relates generally to semiconductor optical amplifiers and, more particularly, to ridge-waveguide type semiconductor optical amplifiers having low polarization gain dependency and methods of making such devices.

**[0010]** According to one exemplary embodiment of the present invention, a semiconductor optical amplifier includes a substrate, a first gain section, disposed on the substrate, ~~for providing a first gain to an optical signal, wherein the first gain has first transverse electric (TE) component and a first transverse magnetic (TM) component, and a magnitude of the first TE component is greater than a magnitude of the first TM component;~~ and a second gain section, disposed on the substrate and adjacent to the first gain section;~~for providing a second gain to the optical signal, wherein the second gain has a second TE component and a second TM component, and a magnitude of the second TM component is greater than a magnitude of the second TE component~~ a residual cladding layer disposed above the first gain section and the second gain section, wherein the residual cladding layer has a first thickness over the first gain section, and a second thickness over the second gain section, the first thickness being different than the second thickness, wherein the first thickness of the residual cladding layer is selected to cause transverse electric (TE) light passing through the first gain section to experience a greater gain than transverse magnetic (TM) light passing through the first gain section; and wherein the second thickness of the residual cladding layer is selected to cause the TM light passing through the second gain section to experience a greater gain than the TE light passing through the second gain section.

**[0016]** FIG. 3 depicts a conventional, ridge-waveguide type SOA having a uniform residual cladding layer thickness;

**[0022]** Devices and methods according to exemplary embodiments of the present invention provide ridge-waveguide semiconductor optical amplifiers whose overall gain is substantially polarization independent, i.e., in the output of semiconductor optical amplifiers according to exemplary embodiments gain provided to input optical energy having a TE polarization is substantially equal to the gain provided to input optical energy having a TM polarization. In the context of the present invention, "substantially polarization independent" refers to a difference between TE and TM overall gain of less than 1dB and, preferably, less than 0.5 dB. This quality of SOAs according to the present invention is achieved by, for example, providing an SOA having at least two different sections, a first section in which TE gain is greater than TM gain and a second section in which TM gain is greater than TE gain. By design, the two sections TE/TM gain differences will offset one another, such that the overall gain is substantially polarization independent. According to exemplary embodiments of the present invention, this can be accomplished by varying the thickness (etch depth) of the residual cladding layer of the SOA.